PATENT
Attorney Docket No. 08364.0017-00

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)
Andrew SINCLAIR	) Group Art Unit: 2121
Application No.: 09/858,235	) Examiner: T. Stevens
Filed: May 17, 2001	)
For: METHODS AND APPARATUS FOR SIMULATING INDUSTRIAL PROCESSES	) Confirmation No.: 1787

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Sir:

APPEAL BRIEF UNDER BOARD RULE § 41.37

In support of the Notice of Appeal filed concurrently herewith, and further to Board Rule 41.37, Appellant presents this brief and encloses herewith a check for the fee of $500.00 required under 37 C.F.R. § 1.17(c).

This Appeal responds to the January 23, 2007 rejection of claims 1-51.

If any additional fees are required or if the enclosed payment is insufficient, Appellant requests that the required fees be charged to Deposit Account No. 06-0916.

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I. Real Party In Interest

The real party in interest is BioPharm Services Limited, the assignee of record.

II. Related Appeals and Interferences

There are currently no other appeals or interferences, of which Appellant, Appellant's legal representative, or Assignee are aware, that will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. Status Of Claims

In the non-final Office Action mailed January 23, 2007, the Examiner rejected claims 1-51 under 35 U.S.C. § 101 as directed toward non-statutory subject matter; rejected claims 1-49 and 51 under 35 U.S.C. § 102(b) as anticipated by Roberts et al., "Object Oriented Simulation Tools Necessary for a Flexible Batch Process Management Architecture" ("*Roberts*"); and rejected claim 50 under 35 U.S.C. § 103(a) as unpatentable over *Roberts* in view of Weaver et al., "Monitoring and Control Using the Internet and Java" ("*Weaver*").

Appellant appeals the rejection of claims 1-51, as set forth in the Office Action of January 23, 2007. A list of the claims on appeal is found in attached Claims Appendix.

Furthermore, each claim of this patent application is separately patentable, and upon issuance of a patent will be entitled to a separate presumption of validity under 35 U.S.C. § 282.

IV. Status Of Amendments

Claims 1-51 were rejected in a final Office Action mailed July 19, 2005. Following an interview with Appellant's representative, the Examiner issued a non-final Office Action on January 20, 2006 rejecting claims 1-51. In response, Appellant filed an Amendment on April 19, 2006, amending claims 1, 5-12, 14, 15, 17-20, 22-42, 44, 45, and 47-51. The Examiner rejected claims 1-51 in a non-final Office Action mailed July 11, 2006. On November 3, 2006, Appellant filed a response traversing those rejections. Consequently, the Examiner again rejected claims 1-51 in an Office Action mailed January 23, 2007. No amendments have been submitted subsequent to the non-final Office Action mailed January 23, 2007.

V. Summary Of Claimed Subject Matter

a. Claim 1

Independent claim 1 is directed to a method of simulating an industrial process. In the method, steps are performed for storing model data indicative of a plurality of processes involving a number of items of equipment to be used in an industrial process to be simulated (*see e.g.,* FIGS. 2 and 3, ref. 9, 10, 17, and 19, p. 19, lines 19-23); and initiating a first simulated batch for simulated processing (*see e.g.,* FIG. 13, S1, p. 35, lines 3-6); generating scheduling data for scheduling the initiation of simulated batches after the initiation of said first simulated batch by, when simulated processing of a latest initiated batch is initiated (*see e.g.,* FIG. 13, S1, p. 35, lines 3-6); identifying items of equipment liable to be involved in simulated processing of a next batch to be initiated after said latest initiated batch (*see e.g.,* FIG. 12, p. 31 line 10 to p. 32, line 8, p. 59, lines 4-22, FIG. 13, S2, p. 35, lines 6-9); utilizing said stored model data to determine for each item of said identified items of equipment a minimum possible simulated processing time required for simulated processing of said latest initiated batch (*see e.g.,* FIG. 13, S2, p. 35, lines 6-9); determining for said identified items of equipment which are currently in use for processing batches currently being processed, the greatest time of use of previously simulated in processing batches using said items of equipment (*see e.g.,* FIG. 13, S3, p. 35, lines 15 to p. 36, line 2); and generating scheduling data for the next batch to be initiated after the latest initiated batch to cause the time between the initiation of said latest initiated batch and said next batch within said simulation to be

equal to the greater of the maximum of said minimum possible simulated processing times for said items of equipment involved in simulated processing of said next batch and said greatest time of use for said identified items of equipment currently in use (*see e.g.,* FIG. 13, S3, p. 36, lines 4-20); and generating output data indicative of a simulation of an industrial process utilizing said stored model data and said generated scheduling data (*see e.g.,* FIG. 11, 140, 142, 144, p. 52, lines 10-25).

b. Claim 9

Independent claim 9 is directed to a method of simulating an industrial process. In the method, steps are performed for storing model data indicative of a plurality of processes involving a number of items of equipment to be used in an industrial process to be simulated (*see e.g.,* FIGS. 2 and 3, p. 19, lines 19-23); determining a time increment step size to be used with said model data (*see e.g.,* FIG. 13, S5, p. 37, lines 11-16); generating output data indicative of a step within a simulation of an industrial process utilizing said stored model data and said determined time increment step size (*see e.g.,* p. 37, lines 15-16), wherein said storing model data further comprises storing rate data in relation to at least some of said processes (*see e.g.,* FIG. 8, ref. 82, p. 26, lines 6-12, FIG. 14, S12, p. 39, lines 5-7), and wherein said determining a time increment step size comprises, for each step in a simulations, the steps of: determining whether any process of said plurality of processes to be simulated is associated with rate data identifying the respective associated process as utilizing a utility at a rate (*see e.g.,* FIG. 6, p. 24, lines 5-10, FIG. 14, S12, lines 5-7); determining a minimum time increment step size required to complete any of the processes currently being simulated (*see e.g.,* FIG. 14, S11, p. 38, line 6 to p. 39, line 3); and selecting, as a time increment

step size for generating output data, a default time increment step size, if at least one process associated with rate data is to be simulated and said default time increment step size is smaller than said determined minimum time increment step size (*see e.g.,* FIG. 14, step S15, p. 39, lines 19-23), and selecting as said time increment step size said determined minimum time increment step size if no process to be simulated is associated with rate data (*see e.g.,* FIG. 14, S14, p. 39, lines 8-10) or said default time increment step size is greater than said determined minimum time increment step size (*see e.g.,* FIG. 14, S13, S14, p. 39, lines 12-19).

c. Claim 18

Independent claim 18 is directed to a method of simulating an industrial process. In the method, steps are performed for storing model data indicative of a plurality of processes involving a number of items of equipment to be used in an industrial process to be simulated (*see e.g.,* FIGS. 2 and 3, p. 19, lines 19-23); and generating output data indicative of a simulation of an industrial process utilizing said stored model data (*see e.g.,* FIG. 11 p. 52, lines 10-25); wherein storing model data may comprise storing data indicative of one or more continuation conditions in association with each of said processes (*see e.g.,* FIG. 5 and FIG. 6, ref. 74, p. 23, line 14 to p. 24, line 2); wherein said generating output data comprises, for each step in a simulation, the steps of: determining which of said plurality of processes are to be simulated (*see e.g.,* FIG. 12, p. 31 line 10 to p. 32, line 8, and p. 59, lines 4-22); determining for the processes to be simulated whether output data generated for a previous step in said simulation fulfils the one or more continuation conditions defined by the stored data associated with said processes being simulated (*see e.g.,* FIG. 13, S3 p. 35, line 12 to p. 36, line 2); and if at

least one continuation condition associated with a process being simulated is not fulfilled by said generated output data simulating a delay in the continued processing of said process (*see e.g.,* FIG. 13, S3 p. 35, line 12 to p. 36, line 2).

d. Claim 22

Independent claim 22 is directed to an apparatus for generating a simulation of an industrial process. The apparatus may comprise a storage means for storing model data indicative of a plurality of processes involving a number of items of equipment to be used in an industrial process to be simulated (*see e.g.,* FIGS. 2 and 3, ref. 9, 10, 17, 19, lines 19-23); determination means for determining scheduling data for initiating batches against which said processes are to be simulated (*see e.g.,* FIG. 2, ref. 17, FIG. 13, S1, p. 35, lines 3-6); an equipment identifier operable to identify items of equipment liable to be involved in simulated processing of a next batch to be initiated after a latest initiated batch (*see e.g.,* FIG. 2, ref. 15, FIG. 12, p. 31 line 10 to p. 32, line 8, p. 59, lines 4-22, FIG. 13, S2, p. 35, lines 6-9); a minimum cycle time determination unit operable to determine, for items of equipment identified by said equipment identifier, a minimum possible simulated time required by each identified item for processing said latest initiated batch (*see e.g.,* FIG. 2, ref. 17, FIG. 13, S2 p. 35, lines 6-9); a current cycle time determination unit operable to determine, for each item of equipment identified by said equipment identifier, a greatest time of use for processing previously initiated batches (*see e.g.,* FIG. 2, ref. 17, FIG. 13, S3, p. 35, lines 15 to p. 36, line 2); a scheduling unit operable to generate scheduling data for scheduling the initiation of a next batch to be initiated after the initiation of a latest initiated batch, said scheduling unit configured to cause the a time between the initiation of a next batch to be initiated

after a latest initiated batch to be equal to the greater of the a maximum of the minimum processing times said minimum cycle time determination unit and the greatest time in use determined by said current cycle time determination unit for items of equipment identified as being liable to process said batch to be scheduled (*see e.g.,* FIG. 2, ref. 17, FIG. 13, S3 and p. 36, lines 4-20); and generation means for generating output data indicative of a simulation of an industrial process utilizing stored model data and scheduling data generated by said scheduling unit (*see e.g.,* FIG. 2, ref. 3 and 17, FIG. 11, ref. 140, 142, and 144, p. 52, lines 10-25).

e. Claim 30

Independent claim 30 is directed to an apparatus for generating a simulation of an industrial process. The apparatus may comprise storage means for storing model data indicative of a plurality of processes involving a number of items of equipment to be used in an industrial process to be simulated (*see e.g.,* FIGS. 2 and 3, ref. 9, 10, 15, 19, p. 19, lines 19-23); means for determining a time increment step size to be used with said model data (*see e.g.,* FIG. 2, ref. 17, p. 37, lines 15-16); and generation means for generating output data indicative of a step within a simulation of an industrial process utilizing said stored model data and a determined time increment step size (*see e.g.,* FIG. 2, ref. 3 and 17, FIG. 11, ref. 140, 142, 144, p. 52, lines 10-25), wherein said means is for storing stores rate data in relation to at least some of said processes (*see e.g.,* FIG. 8, ref. 82, p. 26, lines 6-12, FIG. 14, S12, and p. 39, lines 5-7), and wherein said means for determining a time increment step size comprises: means for determining whether any process of said plurality of processes to be simulated is associated with rate data identifying the respective associated process as utilizing a

utility at a rate (*see e.g.,* FIG. 2, ref. 17, 19, FIG. 6, p. 24, lines 5-10, FIG. 14, S12, lines 5-7); means for determining a minimum time increment step size required to complete my of the processes currently being simulated (*see e.g.,* FIG. 2, ref. 17, 19, FIG. 14, S11, p. 38, line 6 to p. 39, line 3); and selection means for selecting a default time increment step size as the time increment step size for generating output data, if at least one process associated with rate data is to be simulated and said default time increment step size is smaller than said determined minimum time increment step size (*see e.g.,* FIG. 2, ref. 17, 19, FIG. 14, S15, p. 39, lines 19-23), and for selecting said determined minimum time increment step size as said time increment step size, if no process to be simulated is associated with rate data (*see e.g.,* FIG. 14, S14, p. 39, lines 8-10) or said default time increment step size is greater than said determined minimum time increment step size (*see e.g.,* FIG. 14, S13, S14, p. 39, lines 12-19).

f. Claim 38

Independent claim 38 is directed toward an apparatus for simulating an industrial process. The apparatus may comprise a storage means for storing model data indicative of a plurality of processes involving a number of items of equipment to be used in an industrial process to be simulated (*see e.g.,* FIG. 2, refs. 9, 10, 15, and 19, FIG. 3, p. 19, lines 19-23); and generation means for generating output data indicative of a simulation of an industrial process utilizing said stored model data (*see e.g.,* FIG. 2, 3 and 17, FIG. 11, p. 52, lines 10-25), wherein said storage means stores data indicative of one or more continuation conditions in association with each of said processes (*see e.g.,* FIGS. 5 and 6, ref. 74, p. 23, line 14 to p. 24, line 2), and wherein said generation means comprises: means for determining which of said plurality of

processes are to be simulated in a simulation step (*see e.g.,* FIG. 2, ref. 17, 19, FIG. 12, p. 31, line 10 to p. 32, line 8, and p. 59, lines 4-22); and means for determining, for the processes to be simulated, whether output data generated for a previous step in said simulation fulfils the one or more continuation conditions associated with said processes being simulated (*see e.g.,* FIG. 2, ref. 17, 19, FIG. 13, S3, p. 35, line 12 to p. 36, line 2); and, if at least one continuation condition associated with a process being simulated is not fulfilled, for simulating a delay in the continued processing of said process (*see e.g.,* FIG. 13, S3, p. 35, line 12 to p. 36, line 2).

VI. Grounds of Rejection

A. Claims 1-51 stand rejected under 35 U.S.C. § 101 as directed toward non-statutory subject matter.

B. Claims 1-49 and 51 stand rejected under 35 U.S.C. § 102(b) as anticipated by Roberts et al., "Object Oriented Simulation Tools Necessary for a Flexible Batch Process Management Architecture" ("*Roberts*").

C. Claim 50 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Roberts in view of Weaver et al., "Monitoring and Control Using the Internet and Java" ("*Weaver*").

VII. Argument

A. The rejection of claims 1-51 under 35 U.S.C. § 101

The Examiner states, "[c]laims 1-51 are rejected under 35 U.S.C. § 101 because the language denotes a listing of functional events of which no intended use is specified. The claims list computer processing a series of integral steps of the industrial process with no definitive credible result, the mere mention of an output is not credible." (Office Action mailed January 23, 2007, at p. 3.) The Examiner continues, "usefulness is another issue since the claims fail to answer the question of what the invention would be used for." (Office Action at p. 3.) Appellant traverses the Examiner's characterization of claims 1-51 and submit that these claims recite statutory subject matter. For the following reasons, the Examiner's rejection of claims 1-51 under 35 U.S.C. § 101 is legally deficient and should be reversed.

As pointed out in the Reply to Office Action filed on November 3, 2006 ("Reply"), intended use need not be specified in order for a claim to recite statutory subject matter (Reply at p. 3). Instead, the proper test is, "[t]he claimed invention as a whole must accomplish a practical application. That is, it must produce a 'useful, concrete, and tangible result'" (MPEP § 2106, citing *State Street Bank & Trust Co. v. Signature Financial Group Inc.*, 149 F.3d 1368, 1373). Indeed, the "[t]ransformation of data, representing discrete dollar amounts, by a machine through a series of mathematical calculations into a final share price, constitutes a practical application of a mathematical algorithm, formula, or calculation, because it produces 'a useful, concrete, and tangible result' -- a final share price." (MPEP § 2106, citing *State Street* at 1373.)

Here, like the data representing discrete dollar amounts in *State Street*, the model data recited in claim 1 undergoes processing to generate an output. (*See e.g.,* Reply at p. 3.) For example, claim 1 recites a method comprising, *inter alia*, the steps of "storing model data," "initiating a first batch for simulated processing," "generating scheduling data for scheduling the initiation of simulated batches," and "generating output data indicative of a simulation of an industrial process utilizing said stored model data and said generated scheduling data." Thus, similar to the final share price in *State Street*, the claimed output data constitutes a practical application of a calculation, because the output data is indicative of a simulation based on the model data. The simulation outputs are useful in that they are indicative of an industrial process. Indeed, simulation outputs are useful for many reasons. For example, simulation outputs are commonly used across a number of different technological disciplines to gain insight into the simulated process, as well as to evaluate possible solutions. Given the numerous uses of simulation outputs in the technological arts, the claimed "output data indicative of a simulation of an industrial process" can hardly be characterized as "devoid of any limitation to a practical application in the technological arts."

Further, the rejection of claim 1 under 35 U.S.C. § 101 is legally deficient because the Examiner does not demonstrate that the claim does not provide practical application. Instead, the Examiner merely asserts that "[i]n the case of State Street, the credible utility is a share price, while the application states the process as indicative of industrial process, which is nothing more than a factual description of the type of simulation being conducted." (1/23/07 OA at p. 35). However, the MPEP makes clear that "methods and products employing abstract ideas, natural phenomena, and laws of

nature to perform a real-world function may well be [patentable]. In evaluating whether a claim meets the requirements of section 101, the claim must be considered as a whole to determine whether it is for a particular application of an abstract idea, natural phenomenon, or law of nature, and not for the abstract idea, natural phenomenon, or law of nature itself." MPEP § 2106 (IV)(C). "For claims including such excluded subject matter to be eligible for patent protection, the claim must be for a practical application of the abstract idea, law of nature, or natural phenomenon." MPEP § 2106(IV)(C)(2).

"A claimed invention is directed to a practical application of a 35 U.S.C. 101 judicial exception when it: . . . otherwise produces a useful, concrete and tangible result." *Id.* " USPTO personnel shall review the claim to determine it produces a useful, tangible, and concrete result. In making this determination, the focus is not on whether the steps taken to achieve a particular result are useful, tangible, and concrete, but rather on whether the final result achieved by the claimed invention is "useful, tangible, and concrete." MPEP § 2106(IV)(C)(2)(2). In determining whether a claim provides a practical application of a 35 U.S.C. 101 judicial exception that produces a useful, tangible, and concrete result, USPTO personnel should consider and weigh the factors set forth in MPEP § 2106(IV)(C)(2)(2)(a)-(c).

Here, the "output data" generated in claim 1 is a useful, concrete, and tangible result. The "output data" is useful because it represents a simulation of an industrial process. Industrial processes, at least at the time of Appellant's invention, have known useful qualities. And, as noted in Appellant's specification, the results of a simulation of

such industrial processes is likewise useful.[1] Similarly, the claimed "output data" generated in claim 1 is also tangible. The "output data" indicative of a simulation of an industrial process is a real-world result in that the industrial process is being simulated for a useful purpose; providing simulations of industrial processes. Moreover, the "output data" is substantially repeatable, and thus is concrete.

Accordingly, the basis of the Examiner's rejection of claim 1 appears to the improper assertion that an "industrial process" is abstract, has no use, or is not tangible. For instance, the Examiner states that the "credible utility" in *State Street* is the "share price." Indeed, the Examiner acknowledges that the mathematical calculations that lead to the "share price" provide utility and thus rendered the claim statutory. (Office Action mailed January 23, 2007 at p. 35.) Yet, in the same breathe, the Examiner refuses to acknowledge the utility of an industrial process, which one of ordinary skill in the art at the time of Appellant's invention would have recognized as having utility, such as industrial microbiological processes. (*See e.g.,* Specification at 1.)

Appellant disagrees with the Examiner's positions. Industrial processes were well known in the art at the time of Appellant's invention as useful. And, output data indicative of a simulation of such processes is useful, tangible, and concrete result. Like the calculations to produce the share price in *State Street*, the generated "output data"

[1] "Method and apparatus exist to enable industrial processes to be simulated in order to aid designers designing new plants and adapting existing plant[s]. The simulation of an industrial process can enable bottlenecks within production facilities to be identified prior to actual implementation." (Specification at 1-2.) "Simulations of industrial processes enable equipment to be selected so that the capabilities of different items of equipment complement one another thereby ensuring that in a real production line corresponding to the simulation the use of all items of equipment can be maximized." (Specification at 2.) "Such a modeling system can be utilized to simulate such processes and enables the scheduling of batches and capacities of equipment to be selected so that the industrial processes corresponding to the simulation can be efficiently performed." (Specification at 3.)

recited in claim 1 are indicative of a simulation of a real-world thing (i.e., industrial processes). And, as noted above, simulation outputs were (and are) commonly used across a number of different technological disciplines to gain insight into the simulated process, as well as to evaluate possible solutions. Thus, the method of claim 1 provides the practical application of an idea that produces a useful, concrete, and tangible result (e.g., output data indicative of an industrial process).

Additionally, the Examiner improperly confuses the scope of Appellant's claims with regard to industrial processes for purposes of determining the statutory nature of claim 1. The Examiner asserts, "the limitation of outputs range across different technological arts is boundless in view of a specific credible utility." (OA at 35.) However, Appellant is not required to limit the scope of the claimed invention to a particular industrial process to meet the statutory requirements of 35 U.S.C. § 101. Regardless of what industrial process Appellant has claimed, the "output data" recited in claim 1 is indicative of the simulation of an industrial process and thus is a useful, concrete, and tangible result of the practical application of the claimed method of simulating an industrial process. Accordingly, the rejection of claim 1 is legally deficient to the extent the Examiner is asserting that the generated "output data" that is indicative of a simulation is not statutory because it is not limited to a particular industry. Instead, whether claim 1 is restricted to certain types of industrial processes relates to the question of patentability, which is reserved for disposition under 35 U.S.C. §§ 102 and 103, and not § 101.

Although of different scope, independent claims 9, 18, 22, 30, and 38 are similarly directed toward simulating an industrial process, and also recite useful,

concrete, and tangible results. Claims 1, 9, 18, 22, 30, and 38 therefore recite statutory subject matter. Claims 2-8, 10-17, 19-21, 23-29, 31-37, and 39-51 depend from one or more of claims 1, 9, 18, 22, 30, and 38, and are statutory at least due to their dependence from these claims.

Further, the rejection of claims 22, 30, and 38, and their respective dependent claims, under 35 U.S.C. § 101 is further legally deficient because these claims each recite an apparatus for generating a simulation of an industrial process comprising certain elements. The Examiner does not explain how these claims, or their recited elements, are outside the four enumerated statutory categories (i.e., process, machine, manufacture, or composition of matter). "The burden is on the USPTO to set forth a *prima facie* case of unpatentability. Therefore if USPTO personnel determine that it is more likely than not that the claimed subject matter falls outside all of the statutory categories, they must provide an explanation." MPEP § 2106(IV)(B). Here, the Examiner is completely silent on this requirement. Further, it is unclear how the Examiner can support an assertion that claims 22, 30, and 38, and their respective dependent claims, are not within the enumerated statutory categories because each of these claims recite elements that perform certain functions, and are not directed to an abstract idea.[2]

Accordingly, for the foregoing reasons, the rejection of claims 1-51 under 35 U.S.C. § 101 is legally deficient and should be reversed.

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[2] For example, claims 22, 30, and 38 each recite means-plus-function elements that at least require the Examiner to address the structure corresponding to the claimed functions in these claim elements. The Examiner has not done so.

B. The rejection of claims 1-49 and 51 under 35 U.S.C. § 102(b)

To properly anticipate Appellant's claimed invention under 35 U.S.C. § 102(b), each and every element of the claim in issue must be found, either expressly described or under principles of inherency, in a single prior art reference. Further, "[t]he identical invention must be shown in as complete detail as is contained in the...claim." See M.P.E.P. § 2131 (8th Ed., Rev. 5, Aug. 2006), quoting *Richardson v. Suzuki Motor Co.*, 868 F.2d 1126, 1236, 9 U.S.P.Q.2d 1913, 1920 (Fed. Cir. 1989). Finally, "[t]he elements must be arranged as required by the claim." *Id.* *Roberts* does not anticipate claims 1-49 and 51.

i. Claim 1

Claim 1 recites a method of simulating an industrial process comprising, among other things, "utilizing said stored model data to determine <u>for each item of said identified items of equipment a minimum possible simulated processing time</u> required for simulated processing of said latest initiated batch" (emphasis added). *Roberts* fails to teach at least these recitations of claim 1.

Roberts discloses an "architecture for batch process management with particular emphasis on the simulation tools contained in the environment" (*Roberts*, p. 323, abstract). The architecture includes a batch process management assistant that includes a data base of customer orders, and a knowledge base that includes information on equipment history and batch sequencing rules (*Roberts*, pp. 324-326). While the Examiner relies on this portion of *Roberts* as allegedly disclosing the claimed "minimum possible simulated processing times" (Office Action mailed January 23, 2007,

at p. 4), *Roberts* does not indicate that either the equipment history or batch sequencing rules include any minimum possible simulated processing times for items of equipment.

Roberts also discloses a "virtual plant" that contains a software map of an actual plant, including equipment type and capacity, functional capabilities, and other attributes (*Roberts*, p. 324). The Examiner relies on *Roberts'* virtual plant to show the claimed "minimum possible simulated processing times." (Office Action mailed January 23, 2007, at p. 4.) However, *Roberts* does not indicate that the virtual plant includes any representation of any minimum processing time for items of equipment in the virtual plant.

Moreover, in responding to Appellant's arguments, the Examiner cites to several other sections of *Roberts* that do not disclose minimum processing times. For example, the Examiner first relies on *Roberts'* disclosure of a plant changeover in stating that "if change over time is being reduced the minimum processing time must be calculated" (Office Action mailed January 23, 2007, at p. 35). However, *Roberts* discusses "changeover time" in the context of reconfiguring a plant to change the product that the plant manufactures, and does not discuss using minimum simulated processing times to calculate the changeover time (*Roberts*, pp. 324-326).

Next, the Examiner relies on *Roberts'* disclosure that "a time based graphical simulation is conducted using the virtual plant, the process plans and the batch process manager output" (Office Action mailed January 23, 2007, at p. 36). However, *Roberts* does not disclose any details of the simulation that would indicate the simulation uses minimum processing times for equipment.

Finally, the Examiner relies on *Roberts'* disclosure that "[i]n a large plant the process of check[ing] all of the prospective combinations and manipulating the scheduling information manually would be inconceivable . . . [b]ased on the desired time frame and current schedules of equipment, the software can claim available equipment for production or indicated the production is not possible with the time frame under consideration" (Office Action mailed January 23, 2007, at p. 36). However, *Roberts* does not disclose that checking various schedule combinations or manipulating the schedule involves any minimum processing times for equipment. Therefore, *Roberts* does not teach or suggest the claimed "utilizing said stored model data to determine <u>for each item of said identified items of equipment a minimum possible simulated processing time</u> required for simulated processing of said latest initiated batch" (emphasis added).

Additionally, to support the assertion that *Roberts* allegedly anticipates Appellant's claims, the Examiner improperly asserts that having an allegedly common goal results in the cited art teaching unspecified recitations of Appellant's claimed invention. In particular, the Examiner states:

> The Office interprets the Roberts reference as blanketing the claim's incremental time periods by its teaching of equipment scheduling the virtual industrial plant (Roberts: pg. 324, left column, 2"d paragraph, lines 6-8) as well as its time estimating tool (Roberts: pg. 324, right column, 5t" paragraph, lines 13-15). These features are equivalent since the goal is to simulate an efficient industrial plant.

(Office Action mailed January 23, 2007, at p. 2.) However, the Examiner's reasoning, and the conclusion resulting from it, is legally deficient to show anticipation under 35 U.S.C. § 102. Although the Examiner is entitled to interpret claim terms broadly,

such interpretation cannot be unreasonable. Indeed, M.P.E.P. § 2111 indicates "pending claims must be given their broadest reasonable interpretation consistent with the specification." While the Examiner may not be required "to interpret claims in applications in the same manner as a court would interpret claims in an infringement suit," the Examiner is required to apply "to verbiage of the proposed claims the broadest reasonable meaning of the words in their ordinary usage as they would be understood by one of ordinary skill in the art, taking into account whatever enlightenment by way of definitions or otherwise that may be afforded by the written description contained in applicant's specification." *Id.* Accordingly, the broadest reasonable interpretation of, as the Examiner paraphrases, the claimed "incremental time periods" must be consistent with the interpretation of the term that those skilled in the art would reach. *See Id.*

What is more confusing and improper, is that the Examiner does not proffer any interpretation of specific language recited in Appellant's claims. Instead, the Examiner makes a blanket statement indicating that *Roberts*' scheduling of virtual industrial plants is "equivalent" to the claimed "incremental time periods" without identifying exactly what recitations the Examiner is referencing or interpreting. This reasoning is improper and cannot be relied upon to support a showing of anticipation under 35 U.S.C. § 102.

Because *Roberts* fails to teach at each and every recitation of claim 1, *Roberts* does not anticipate claim 1 under 35 U.S.C. § 102(b). Accordingly, Appellant respectfully requests that the Board reverse the rejection of claim 1 under 35 U.S.C. § 102(b) and allow the claim.

ii. Claim 9

Claim 9 recites a method of simulating an industrial process comprising, among other things, "selecting, as a time increment step size … [a] determined minimum time increment step size if … [a] default time increment step size is greater than [a] determined minimum time increment step size." *Roberts* fails to teach at least these recitations of claim 9.

Roberts discloses a "plant data base," used in conjunction with a simulation module, to determine possible schedules, and the schedules can depend on the equipment used (*Roberts*, p. 329), and the Examiner alleges that the plant data base anticipates the claimed "default minimum time increment step size" and "determined minimum time increment step size." However, *Roberts* does not disclose maintaining any time increments in the plant database.

Indeed, *Roberts'* only disclosure of a time increment is on p. 327, stating that "a pseudo real-time simulation is maintained using fixed time increment updates generated by the computer clock." Thus, *Roberts* does not disclose "selecting" a "time increment step size" at all, using only the computer clock as the step size. Moreover, even assuming the computer clock corresponds to the claimed "default time increment step size" – a position that Appellant rejects – *Roberts* discloses no step size analogous to the claimed "determined minimum time increment step size." Because *Roberts* fails to identify any selecting of a time increment other than a fixed time increment corresponding to the computer clock, *Roberts* fails to teach or suggest "selecting, as a time increment step size … [a] determined minimum time increment step size if … [a]

default time increment step size is greater than [a] determined minimum time increment step size," as recited by claim 9.

For at least this reason, *Roberts* fails to teach at each and every recitation of claim 9. Consequently, *Roberts* does not anticipate claim 9 under 35 U.S.C. § 102(b). Accordingly, in addition to the reasons set forth above in section VII(B)(i) in connection with the Examiner's blanket statement regarding Appellant's "incremental time periods," the rejection of claim 9 is legally deficient. Therefore, Appellant respectfully requests that the Board reverse the rejection of claim 9 under 35 U.S.C. § 102(b) and allow the claim.

iii. Claim 18

Claim 18 recites a method of simulating an industrial process comprising, among other things, "if at least one continuation condition associated with a process being simulated is not fulfilled by said generated output data simulating a delay in the continued processing of said process." *Roberts* fails to teach this subject matter of claim 18.

The Examiner again cites to portions of *Roberts* disclosing a "plant data base" in alleging the reference teaches this subject matter of claim 18. (Office Action mailed January 23, 2007 at p. 16, citing *Roberts* p. 328, left column, bullet number 5.) *Roberts* also discloses, "[a] simulation assistant processes the changes in system states and maps these states to [a] generic control code specification … [s]ystem states are updated based on the specification by sending messages to the equipment instances. The equipment instances receive these messages and update their own internal states" (*Roberts* p. 327, ¶ 9 - p. 328, ¶ 1). However, as pointed out in the Reply to Office Action

filed November 3, 2006, at p. 7, *Roberts* is silent as to any continuation conditions, and also fails to disclose simulating a delay based on continuation conditions.

In response, the Examiner states:

> *Roberts* inherently teaches this limitation. If persons of ordinary skill the art were to dissect the prior art and the application, their conclusion would be that the two documents are disclosing the same intent. Delays are interruptions/disruptions of a process or simulation relating to a timing problem stemmed from a conflict of some kind, otherwise no delay would exits. In which case *Roberts* addresses these conflicts by schedule rearrangement (pg. 324, right column, 4th paragraph).

(Office Action mailed January 23, 2007, at p. 37). The Examiner's reasoning, however, is legally deficient for at least a couple of reasons.

First, whether or not *Roberts* has the same "intent" as the claimed invention is does not demonstrate how *Roberts* allegedly anticipates claim 18. Thus, to the extent the Examiner relies on what the cite art intends to support the assertion of anticipation, the rejection of claim 18 under 35 U.S.C. § 102 is legally deficient, and should be reversed.

Moreover, MPEP § 2112 (IV) states: "[i]n relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." Here, the Examiner provides no persuasive reason why *Roberts* necessarily discloses the claimed "if at least one continuation condition associated with a process being simulated is not fulfilled by said generated output data simulating a delay in the continued processing of said process." The Examiner has not proffered any basis to support an assertion that simulations necessarily involve simulating delays, or simulating such delays if a continuation

condition is not fulfilled. Likewise, while the Examiner cites to *Roberts'* disclosure of schedule rearrangement, the Examiner gives no persuasive reason why schedule rearrangement necessarily involves simulating delays, or simulating such delays if a continuation condition is not fulfilled. Indeed, *Roberts*, fails to teach or suggest "if at least one continuation condition associated with a process being simulated is not fulfilled by said generated output data simulating a delay in the continued processing of said process" as recited by claim 18.

Because *Roberts* fails to teach at each and every recitation of claim 18, and that the Examiner improperly asserts the intention of the cited art supports anticipation and does not offer an adequate basis to support the position the cited art inherently discloses the above identified claim recitations, the rejection of claim 18 under 35 U.S.C. § 102(b) is legally deficient. Accordingly, Appellant respectfully requests that the Board reverse the rejection of claim 18 and allow the claim.

iv. Claims 22, 30, and 38

Independent claim 22, though of different scope from claim 1, recites limitations similar to those set forth above with respect to claim 1. Independent claim 30, though of different scope from claim 9, recites limitations similar to those set forth above with respect to claim 9. Independent claim 38, though of different scope from claim 18, recites limitations similar to those set forth above with respect to claim 18. As explained, *Roberts* does not teach each and every recitation of independent claims 1, 9, and 18. Moreover, the Examiner's rejection of these claims are legally deficient for those reasons stated above. Accordingly, for at least the same reasons set forth above in connection with claims 1, 9, and 18, the rejection of claims 22, 30, and 38 is also

legally deficient and is not supported by the cited art. Therefore, Appellant respectfully requests that the Board reverse the rejection of claims 22, 30, and 38 under 35 U.S.C. § 102(b) and allow the claims.

v. Claims 2-8, 10-17, 19-21, 23-29, 31-37, 39-49, and 51

Claims 2-8, 10-17, 19-21, 23-29, 31-37, 39-49, and 51 each depend from one or more of independent claims 1, 9, 18, 22, 30, and 38. As explained, *Roberts* does not teach each and every recitation of independent claims 1, 9, 18, 22, 30, and 38. Moreover, the Examiner's rejection of these claims are legally deficient for those reasons stated above. Accordingly, for at least the same reasons set forth above in connection with claims 1, 9, 18, 22, 30, and 38, the rejection of dependent claims 2-8, 10-17, 19-21, 23-29, 31-37, 39-49, and 51 is also legally deficient and is not supported by the cited art. For at least these reasons, Appellant respectfully requests that the Board reverse the rejection of claims 2-8, 10-17, 19-21, 23-29, 31-37, 39-49, and 51 under 35 U.S.C. § 102(b) and allow the claims.

Claim 11 further distinguishes *Roberts*. Claim 11 recites "a method in accordance with claim 10, wherein said generating output data comprises determining, for steps in a simulation, output data representative of an <u>instantaneous demand for a utility</u> corresponding to an item of utility type data utilizing determined <u>sums of rate data</u> associated with said utility type data for processes being simulated (emphasis added). To allegedly show these recitations, the Examiner relies on *Roberts'* disclosure of a "plant data base" in addressing these recitations of claim 11 (Office Action mailed January 23, 2006, at p. 12). However, this portion, or any other portion of *Roberts*, does not show that the plant data base includes any data that can reasonably

characterized as representative of "instantaneous demand for a utility," or as "sums of rate data." As a result, the cited art does not support the Examiner's rejection of claim 11. Accordingly, for at least this additional reason, Appellant requests that the Board reverse the rejection of claim 11 under 35 U.S.C. § 102(b).

Moreover, claim 16 further distinguishes *Roberts*. Claim 16 recites "a method in accordance with claim 10, wherein said generated output data associated with utility type data comprises <u>data indicative of the simulated availability of utilities or waste processing capacity</u>" (emphasis added). Again, the Examiner relies only on *Roberts'* disclosure of a "plant data base" to support the assertion that these recitations are anticipated. (Office Action mailed January 23, 2007, at p. 14.) However, *Roberts* does not disclose that the plant data base contains any data indicative of simulated availability of utilities, or data indicative of simulated availability of waste processing capacity. Thus, the cited art does not support the Examiner's rejection of claim 16. Accordingly, for at least this additional reason, Appellant requests that the Board reverse the rejection of claim 16 under 35 U.S.C. § 102(b).

<u>C.</u> <u>The rejection of claim 50 under 35 U.S.C. § 103(a)</u>

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, the prior art reference or references, taken alone or combined, must teach or suggest each and every element recited in the claims. *See* M.P.E.P. § 2143.03. Second, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to combine the references in a manner resulting in the claimed invention. *See* M.P.E.P. § 2143. Third, a reasonable expectation of success must exist. *See*

M.P.E.P. § 2143.02. Moreover, each of these requirements must "be found in the prior art, and not based on Appellant's disclosure." M.P.E.P. § 2143. For at least the following reasons, Appellant respectfully submits the Examiner has failed to establish a *prima facie* case of obviousness in connection with the rejections of claim 50.

Claim 50 depends, indirectly, from each of claims 1, 9, and 18. As discussed, claim 1 recites, *inter alia*, "utilizing said stored model data to determine for each item of said identified items of equipment a <u>minimum possible simulated processing time</u> required for simulated processing of said latest initiated batch." Claim 9 recites, *inter alia*, "selecting, as a <u>time increment step size</u> ... [a] determined minimum time increment step size if ... [a] default time increment step size is greater than [a] determined minimum time increment step size." Claim 18 recites, *inter alia*, "if at least one <u>continuation condition</u> associated with a process being simulated is not fulfilled by said generated output data <u>simulating a delay</u> in the continued processing of said process" (emphasis added). As explained above in section VII(B), *Roberts* fails to teach or suggest each of these limitations. *Weaver* fails to cure the deficiencies of *Roberts*.

Weaver discloses using Java for "remote monitoring and control of manufacturing operations" (*Weaver*, p. 1152). *Weaver* illustrates the use of Java in a number of such contexts, including an electron microscope (p. 1153), a virtual spectrometer (pp. 1155-1156), and factory monitoring (pp. 1156-1157). However, *Weaver* does not disclose any minimum possible simulated processing times, time increments, continuation conditions, or simulating a delay.

Because *Roberts* or *Weaver*, alone or in combination, fail to teach or suggest each and every element required by claim 50, Appellant submits the Examiner has not established a *prima facie* case of obviousness. For at least these reasons, Appellant respectfully requests that the Board reverse the rejection of claim 50 under 35 U.S.C. § 103(a) and allow the claim.

VIII. Conclusion

For the reasons given above, Appellant respectfully requests that the rejections of pending claims 1-51 be reversed and the claims allowed.

To the extent any extension of time under 37 C.F.R. § 1.136 is required to obtain entry of this Appeal Brief, such extension is hereby respectfully requested. If there are any fees due under 37 C.F.R. §§ 1.16 or 1.17 which are not enclosed herewith, including any fees required for an extension of time under 37 C.F.R. § 1.136, please charge such fees to our Deposit Account No. 06-0916.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW,
GARRETT & DUNNER, L.L.P.

Dated: May 22, 2007

By: #56,249
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Reg. No. 46,508

IX: Claims Appendix

1. (Previously Presented) A method of simulating an industrial process comprising the steps of:

storing model data indicative of a plurality of processes involving a number of items of equipment to be used in an industrial process to be simulated;

initiating a first simulated batch for simulated processing;

generating scheduling data for scheduling the initiation of simulated batches after the initiation of said first simulated batch by, when simulated processing of a latest initiated batch is initiated:

identifying items of equipment liable to be involved in simulated processing of a next batch to be initiated after said latest initiated batch;

utilizing said stored model data to determine for each item of said identified items of equipment a minimum possible simulated processing time required for simulated processing of said latest initiated batch;

determining for said identified items of equipment which are currently in use for processing batches currently being processed, the greatest time of use of previously simulated in processing batches using said items of equipment; and

generating scheduling data for the next batch to be initiated after the latest initiated batch to cause the time between the initiation of said latest initiated batch and said next batch within said simulation to be equal to the greater of the maximum of said minimum possible

simulated processing times for said items of equipment involved in simulated processing of said next batch and said greatest time of use for said identified items of equipment currently in use; and

generating output data indicative of a simulation of an industrial process utilizing said stored model data and said generated scheduling data.

2. (Previously presented) A method in accordance with claim 1, wherein said determination of the greatest time of use of an item of equipment utilized in processing comprises the steps of:

storing in association with each item of equipment to be simulated data indicative of the time of use of said item of equipment for a batch previously processed by said item of equipment; and

determining as the greatest time of use the greatest time of use of said stored times of use.

3. (Original) A method in accordance with claim 1, wherein said determining of the greatest time of use of an item of equipment further comprises for each of the said items of equipment the steps of:

determining whether an item of equipment is in use; and if an item of equipment is in use determining the total time the item of equipment has been in use for a current batch; and if an item of equipment is no longer in use storing said total time in use as said time in use for said equipment.

4. (Original) A method in accordance with claim 3, wherein each of said items of equipment is associated with a number of processes wherein said determination of whether an item of equipment is in use comprises determining whether any of said processes associated with said item of equipment is currently being simulated.

5. (Previously Presented) A method in accordance with claim 1,

wherein said utilizing said stored model data to determine a minimum possible simulated processing time for each of said identified items of equipment comprises storing, for each batch to be initiated, data indicative of the greatest of said minimum possible processing times; and

wherein said generating scheduling data for the next batch to be initiated after the latest initiated batch comprises utilizing said data indicative of the greatest of said minimum possible processing times to generate said scheduling data.

6. (Previously Presented) A method in accordance with claim 1, wherein said utilizing said stored model data to determine a minimum possible simulated processing time for each of said identified items of equipment comprises:

associating, with a batch to be initiated, data to be indicative of the items of equipment to be utilized in simulated processing of said batch; and

determining said minimum possible simulated processing time for each item of equipment associated with said batch to be initiated.

7. (Previously Presented) A method in accordance with claim 6, wherein each of the said items of equipment is associated with a number of processes, each of said processes being associated with data identifying one or more completion conditions for that process, and one or more of said processes being associated with data identifying completion conditions including one or more lapses of one or more specified time periods in the simulation of a process,

wherein said utilizing said stored model data to determine a minimum possible simulated processing time for each of said identified items of equipment comprises determining a sum of said one or more specified time periods included in the one or more completion

conditions associated with said one or more processes of said items of equipment.

8. (Previously Presented) A method in accordance with claim 7,

wherein said storing model data further comprises associating, with at least some of said number of processes involving said items of equipment, rate data identifying the respective associated process as utilizing a utility at a rate; and

wherein said generating output data comprises, for each step in a simulation, the steps of:

determining whether any process of said plurality of processes to be simulated is associated with rate data;

determining the minimum time increment step size required to complete any of the processes currently being simulated; and

selecting as a time increment step size for generating output data a default time increment step size, if at least one process associated with rate data is to be simulated and said default time increment step size is smaller than said determined minimum time increment step size, and selecting as said time increment step size said determined minimum time increment step size if no process to be simulated is associated with rate data or said default time increment step size is greater than said determined minimum time increment step size.

9. (Previously Presented) A method of simulating an industrial process comprising the steps of:

storing model data indicative of a plurality of processes involving a number of items of equipment to be used in an industrial process to be simulated;

determining a time increment step size to be used with said model data; and

generating output data indicative of a step within a simulation of an industrial process utilizing said stored model data and said determined time increment step size,

wherein said storing model data further comprises storing rate data in relation to at least some of said processes, and

wherein said determining a time increment step size comprises, for each step in a simulations, the steps of:

determining whether any process of said plurality of processes to be simulated is associated with rate data identifying the respective associated process as utilizing a utility at a rate;

determining a minimum time increment step size required to complete any of the processes currently being simulated; and

selecting, as a time increment step size for generating output data, a default time increment step size, if at least one process associated with rate data is to be simulated and said default time increment step size is smaller than said determined minimum time increment step size, and selecting as said time increment step size said determined minimum time increment step size if no process to be simulated is associated with rate data or said default time increment step size is greater than said determined minimum time increment step size.

10. (Previously Presented) A method in accordance with claim 9,

wherein said storing model data further comprises associating utility type data with said at least some of said plurality of processes, and

wherein said generating output data comprises generating, for steps in a simulation, output data associated with items of utility type data utilizing rate data associated with a process being simulated and said determined time increment step size.

11. (Previously Presented) A method in accordance with claim 10, wherein said generating output data comprises determining, for steps in a simulation, output data representative of an instantaneous demand for a utility corresponding to an item of utility type data utilizing determined sums of rate data associated with said utility type data for processes being simulated.

12. (Previously Presented) A method in accordance with claim 10, wherein said generating output data for steps within a simulation comprises:

storing, in association with items of utility data, quantity data indicative of a current quantity of a utility within a simulation, wherein said quantity data is determined utilizing rate data associated with processes being simulated and said determined time increment step size.

13. (Previously presented) A method in accordance with claim 12, wherein said quantity data for a step in a simulation is determined by incrementing or decrementing quantity data associated with utility type data for the previous step in a simulation by the product of said determined time increment step size and the sum of rate data associated with said utility data and processes being simulated.

14. (Previously Presented) A method in accordance with claim 13,

wherein said storing model data further comprises storing, in association with said items of utility type data, minimum quantity data and generation rate data,

wherein said quantity data of for a step in a simulation is determined by incrementing or decrementing quantity data for the previous step in a simulation by the product of said generation rate data and said determined time increment step size if said quantity data is less than said minimum quantity data associated with said utility type.

15. (Previously Presented) A method in accordance with claim 14, wherein storing model data further comprises storing maximum quantity data in association with said items of utility type data,

wherein said quantity data for a step in a simulation is determined by incrementing or decrementing quantity data for the previous step in a simulation by the product of said generation rate data and said determined time increment step size only when said quantity data associated with said utility type does not exceed said maximum quantity data associated with said utility type.

16. (Original) A method in accordance with claim 10, wherein said generated output data associated with utility type data comprises data indicative of the simulated availability of utilities or waste processing capacity.

17. (Previously Presented) A method in accordance with claim 12,

wherein said storing model data comprises storing, in association with at least some of said plurality of processes, data indicative of one or more continuation conditions, and

wherein said generating output data comprises, for each step in a simulation, the steps of.

determining which of said plurality of processes are to be simulated in said step of said simulation;

determining for processes to be simulated associated with data indicative of one or more continuation conditions whether output data generated for the previous step in said simulation fulfills the one or more continuation conditions defined by said data; and

if at least one continuation condition for a process being simulated is not fulfilled simulating a delay in the continued processing of said process.

18. (Previously Presented) A method of simulating an industrial process comprising the steps of:

storing model data indicative of a plurality of processes involving a number of items of equipment to be used in an industrial process to be simulated; and

generating output data indicative of a simulation of an industrial process utilizing said stored model data,

wherein said storing model data comprises storing data indicative of one or more continuation conditions in association with each of said processes, and

wherein said generating output data comprises, for each step in a simulation, the steps of:

determining which of said plurality of processes are to be simulated;

determining for the processes to be simulated whether output data generated for a previous step in said simulation fulfils the one or more continuation conditions defined by the stored data associated with said processes being simulated; and

if at least one continuation condition associated with a process being simulated is not fulfilled by said

generated output data simulating a delay in the continued processing of said process.

19. (Previously Presented) A method in accordance with claim 18, wherein said data indicative of one or more continuation conditions associated with a process comprises data defining an equation which quantity data associated with utility type data is required to fulfill.

20. (Previously Presented) A method in accordance with claim 18, wherein said storing model data comprises storing, in association with each of said plurality of processes, data indicative of subsequent processes to be simulated following the completion of each said process, wherein determining which of said plurality of processes are to be simulated comprises:

determining for each process simulated in the previous step of a simulation whether the one or more continuation conditions associated with each process being simulated have been fulfilled; and

determining as processes to be simulated:

processes being simulated for which not all of the continuation conditions have been fulfilled and the processes identified by said stored data as subsequent processes to be simulated which are associated with simulated processes for which all of completion conditions associated with those processes have been fulfilled.

21. (Previously presented) A method of performing an industrial process comprising the steps of:

simulating an industrial process in accordance with any one of claims 1, 9 or 18 to determine apparatus required to perform a process;

providing apparatus corresponding to said items of equipment simulated; and

utilizing said apparatus to perform said industrial process simulated.

22. (Previously Presented) An apparatus for generating a simulation of an industrial process comprising:

storage means for storing model data indicative of a plurality of processes involving a number of items of equipment to be used in an industrial process to be simulated;

determination means for determining scheduling data for initiating batches against which said processes are to be simulated;

an equipment identifier operable to identify items of equipment liable to be involved in simulated processing of a next batch to be initiated after a latest initiated batch;

a minimum cycle time determination unit operable to determine, for items of equipment identified by said equipment identifier, a minimum possible simulated time required by each identified item for processing said latest initiated batch;

a current cycle time determination unit operable to determine, for each item of equipment identified by said equipment identifier, a greatest time of use for processing previously initiated batches;

a scheduling unit operable to generate scheduling data for scheduling the initiation of a next batch to be initiated after the initiation of a latest initiated batch,

said scheduling unit configured to cause the a time between the initiation of a next batch to be initiated after a latest initiated batch to be equal to the greater of the a maximum of the minimum processing times said minimum cycle time determination unit and the greatest time in use determined by said current cycle time determination unit for items of equipment

identified as being liable to process said batch to be scheduled; and

generation means for generating output data indicative of a simulation of an industrial process utilizing stored model data and scheduling data generated by said scheduling unit.

23. (Previously Presented) An apparatus in accordance with claim 22, wherein said current cycle time determination unit comprises:

means for storing, in association with each item of equipment to be simulated, data indicative of it a time of use of said item of equipment for a batch previously processed by said item of equipment,

wherein said current cycle time determination unit determines, as the greatest time of use, the greatest time of use of said stored times of use stored in said means for storing included in said current cycle time determination unit.

24. (Previously Presented) An apparatus in accordance with claim 22, wherein said current cycle time determination unit is configured to:

determine, for each of the said items of equipment identified by said equipment identifier, whether an item of equipment is in use;

determine, if an item of equipment is in use, a total time the item of equipment has been in use for a current batch; and

store, if an item of equipment is no longer in use, said total time in use as said time in use for said equipment.

25. (Previously Presented) An apparatus in accordance with claim 24, wherein said means for storing comprises means for storing model data associating each of said items of equipment with a number of processes, wherein said current cycle time determines whether any of said processes associated with an item of equipment is currently being simulated to determine whether an item of equipment is in use.

26. (Previously Presented) An apparatus in accordance with claim 22, wherein said minimum cycle time determination unit comprises means for storing, in association with each batch to be initiated, data indicative of a greatest of said minimum possible processing times, wherein said minimum cycle time determination unit utilizes said data indicative of the greatest of said minimum possible processing times to generate scheduling data.

27. (Previously Presented) An apparatus in accordance with claim 22, wherein said minimum cycle time determination unit comprises:

means for associating, with a batch to be initiated, data indicative of items of equipment to be utilized in simulated processing of said batch, wherein said minimum cycle time determination unit utilizes said data indicative of the items and associated with said batch.

28. (Previously Presented) An apparatus in accordance with claim 27, wherein said means for storing comprises:

means for associating said items of equipment with data indicative of a number of processes and data identifying one or more completion conditions for each of said processes, at the least some of said processes being associated with data identifying one or more completion conditions including at least one lapse of at least one specified time period in the simulation of a process,

wherein said minimum cycle time determination unit determines a sum of said specified time periods identified as completion conditions for processes associated with said items of equipment.

29. (Previously Presented) An apparatus in accordance with claim 28,

wherein said means for storing further comprises means for associating at least some of said plurality of processes with rate data; and

wherein said generation means further comprises:

means for determining whether any process of said plurality of processes to be simulated is associated with rate data identifying the respective associated process as utilizing a utility at a rate;

means for determining a minimum time increment step size required to complete any of the processes currently being simulated; and

selection means for selecting a default time increment step size as the time increment step size for generating output data, if at least one process associated with rate data is to be simulated and said default time increment step size is smaller than said determined minimum time increment step size, and for selecting said determined minimum time increment step size as said time increment step size, if no process to be simulated is associated with rate data or said default time increment step size is greater than said determined minimum time increment step size.

30. (Previously Presented) An apparatus for generating a simulation of an industrial process comprising:

storage means for storing model data indicative of a plurality of processes involving a number of items of equipment to be used in an industrial process to be simulated;

means for determining a time increment step size to be used with said model data; and

generation means for generating output data indicative of a step within a simulation of an industrial process utilizing said stored model data and a determined time increment step size,

wherein said means is for storing stores rate data in relation to at least some of said processes, and

wherein said means for determining a time increment step size comprises:

means for determining whether any process of said plurality of processes to be simulated is associated with rate data identifying the respective associated process as utilizing a utility at a rate;

means for determining a minimum time increment step size required to complete my of the processes currently being simulated; and

selection means for selecting a default time increment step size as the time increment step size for generating output data, if at least one process associated with rate data is to be simulated and said default time increment step size is smaller than said determined minimum time increment step size, and for selecting said determined minimum time increment step size as said time increment step size, if no process to be simulated is associated with rate data or said default time increment step size is greater than said determined minimum time increment step size.

31. (Previously Presented) An apparatus in accordance with claim 29, wherein said means for storing comprises means for associating utility type data with said at least some of said plurality processes, and wherein said generation means outputs data associated with items of utility type data utilizing rate data associated with a process being simulated and said determined time increment step size.

32. (Previously Presented) An apparatus in accordance with claim 31, wherein said generation means outputs data representative of instantaneous demand for a utility corresponding to an item of utility type data utilizing determined sums of rate data associated with said utility type data for processes being simulated.

33. (Previously Presented) An apparatus in accordance with claim 31, wherein said means for storing stores, in association with items of utility data, quantity data indicative of a current quantity of a utility within a simulation, and wherein said generation means outputs quantity data that is determined utilizing rate data associated with processes being simulated and said determined time increment step size.

34. (Previously Presented) An apparatus in accordance with claim 31, wherein said generation means determines quantity data for a step in a simulation by incrementing or decrementing quantity data associated with utility type data for the previous step in a simulation by the product of said determined time increment step size and the sum of rate data associated with said utility data and processes being simulated.

35. (Previously Presented) An apparatus in accordance with claim 34,

wherein said means for storing stores, in association with said items of utility type data, minimum quantity data and generation rate data, and

wherein said generation means outputs quantity data associated with an item of utility type data for a step within a simulation by incrementing or decrementing quantity data for the previous step in a simulation by the product of said generation rate data and said determined time increment step size if said quantity data is less than said minimum quantity data associated with said utility type.

36. (Previously Presented) An apparatus in accordance with claim 35,

wherein said means for storing stores maximum quantity data in association with said items of utility type data, and

wherein said generation means outputs quantity data associated with an item of utility type data for a step within a simulation determined by incrementing or decrementing quantity data associated with said utility type for the previous step in a simulation by the product of said generation rate data and said determining time increment step size only when said quantity data associated with said utility type does not exceed said maximum quantity data associated with said utility type.

37. (Previously Presented) An apparatus in accordance with claim 31,

wherein said means for storing stores, in association with at least some of said plurality of processes, data indicative of one or more continuation conditions, and

wherein said generation means comprises:

means for determining which of said plurality of processes are to be simulated in a simulation step; and

means for determining, for processes to be simulated associated with data indicative of one or more continuation conditions, whether output data generated for a previous step in said simulation fulfills the one or more continuation conditions; and, if at

least one continuation condition associated with a process being simulated is not fulfilled by said generating output data, for simulating a delay in the continued processing of said process.

38. (Previously Presented) An apparatus for simulating an industrial process comprising:

storage means for storing model data indicative of a plurality of processes involving a number of items of equipment to be used in an industrial process to be simulated; and

generation means for generating output data indicative of a simulation of an industrial process utilizing said stored model data,

wherein said storage means stores data indicative of one or more continuation conditions in association with each of said processes, and

wherein said generation means comprises:

means for determining which of said plurality of processes are to be simulated in a simulation step; and

means for determining, for the processes to be simulated, whether output data generated for a previous step in said simulation fulfils the one or more continuation conditions associated with said processes being simulated; and, if at least one continuation condition associated with a process being simulated is not fulfilled, for simulating a delay in the continued processing of said process.

39. (Previously Presented) An apparatus in accordance with claim 37, wherein said means for storing stores data indicative of a continuation condition that comprises data defining an equation which quantity data associated with utility type data is to fulfill.

40. (Previously Presented) An apparatus in accordance with claim 37, wherein said means for storing stores, in association with each of said plurality of processes, data indicative of a next processes to be simulated following the completion of each said process,

wherein said means for determining of which of said plurality of processes are to be simulated comprises:

means for determining, for each process simulated in a previous step of a simulation, whether the one or more continuation conditions associated with each process being simulated have been fulfilled; and

means for determining as processes to be simulated:

processes being simulated for which not all of the continuation conditions have been fulfilled and processes identified by data in said storage means as next processes to be simulated which are associated by said data with processes for which said completion conditions have been fulfilled.

41. (Previously Presented) A method in accordance with claim 1, wherein determining scheduling data further comprises:

when a batch is being initiated, determining time remaining in a current shift and re-scheduling said batch if said time remaining is less than an estimated time required far processing said batch.

42. (Previously Presented) A method in accordance with claim 41, wherein said re-scheduling of said batch comprises re-scheduling said batch for the next shift if said time remaining is less than a minimum processing time for said batch.

43. (Original) A method in accordance with claim 41, wherein said estimated time required is determined by calculating the sum of the greater of the greatest time of use of items of equipment utilized in processing said batches and minimum possible processing times for processing said batch in accordance with said model data for said items of equipment.

44. (Previously Presented) An apparatus in accordance with claim 22, wherein said determination means for determining scheduling data includes means for determining time remaining in a current shift when a batch is being initiated, and means for re-scheduling said batch if said time remaining is less than an estimated time required for processing said batch.

45. (Previously Presented) An apparatus in accordance with claim 44, wherein said means for re-scheduling said batch re-schedules said batch for the next shift if said time remaining is less than a minimum processing time for said batch.

46. (Original) An apparatus in accordance with claim 44, wherein said estimated time is determined by calculating the sum of the greater of the greatest time of use of items of equipment utilized in processing said batches and minimum possible processing tunes for processing said batch in accordance with said model data for said items of equipment.

47. (Previously Presented) A computer-readable recording medium, storing executable processor steps for performing a method in accordance with any one of claims 1, 9 or 18.

48. (Previously Presented) A computer-readable recording medium storing executable processor steps for causing a programmable computer to implement an apparatus in accordance with any one of claims 22, 30 or 38.

49. (Previously Presented) A computer-readable recording medium in accordance with claim 47 comprising a computer disc.

50. (Previously Presented) A computer-readable recording medium in accordance with claim 47, comprising an electric signal transferred via the Internet.

51. (Previously Presented) A computer-readable recording medium in accordance with claim 49, wherein said computer disc comprises at least one of an optical disc, magneto-optical disc, or a magnetic disc.

X: Evidence Appendix

There is no evidence being relied upon by Appellant in this appeal.

XI: Related Proceedings Appendix

None.